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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,651	11/20/2001	David L. Larkin	TI-23422.1	8936

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EXAMINER	
ANYA, IGWE U	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/988,651	LARKIN ET AL.	
	Examiner	Art Unit	
	Igwe U. Anya	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-21* is/are rejected.

7)☒ Claim(s) *22-29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 22 – 29 are objected to because of the following informalities: claims 22 – 29 are repetitions of claims 13 – 20. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 12, 14 – 18, 20, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al. (US Patent 5866945).

4. Chen et al. teach a semiconductor device manufactured using the following process:

providing a semiconductor device having at least one metal layer (51) completed (fig. 5);

then applying a planarizing dielectric layer comprising a first layer of TEOS (50), a second layer of HSQ (52), and a third layer of TEOS (53, 54) on top of the semiconductor device;

then providing a hydrogen treatment until hydrogen diffuses throughout the semiconductor device (col. 6 line 59 – col. 7 line 29);

wherein the hydrogen treatment includes applying hydrogen in situ by introducing hydrogen as plasma to the semiconductor device (col. 5 lines 11 – 30);

wherein the first layer and third layer of TEOS is applied by PECVD (col. 1 lines 54 – 56);

wherein the second layer of HSQ is applied by coating applied over a first layer of dielectric material (col. 2 lines 55 – 67);

wherein the semiconductor device is treated with nitrogen plasma after an HSQ layer of a multilayer planarizing dielectric layer is added (col. 5 lines 15 – 20); and

wherein the semiconductor device undergoes the hydrogen treatment after a final layer of the planarizing dielectric layer is added (col. 7 lines 25 – 29).

5. Claims 10 – 13, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukuda et al. (JP 407074167).

6. Fukuda et al. teach a method of reducing hot channel carrier degradation, comprising saturating a completely formed MOSFET (fig. 8) with hydrogen and optimizing the hydrogen present in the gate dielectric to completely terminate dangling bonds present. The MOSFET has planarizing layers of BPSG (17), and PSG (20) formed on top. The method further includes a hydrogen heat treatment to diffuse hydrogen through the MOSFET after the final planarizing layer (20) is formed but, before formation of protection layer (21). (Abstract).

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA

1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 12 – 20, and 22 – 29 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 - 9 of U.S. Patent No. 6350673). Although the conflicting claims are not identical, they are not patentably distinct from each other, because claims of instant application recite claims 1 – 9 of the patent, except for the preamble.

9. The examiner has not given any patentable weight to the preamble, because it has been held that a preamble is denied the effect of a limitation where the claim following the preamble is a self-contained description of the not depending not depending for completeness upon the introductory clause. Kropa Vs. Robie, 88 USPQ 478 (CCPA 1951).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 13, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US Patent 5866945).

13. Chen et al. teach the features previously outlined, and further teach substitution of SOG with HSQ to avoid poisoning of the via (col. 2 lines 55 – 58), but lack the steps wherein the semiconductor device undergoes an N2 bake after an HSQ layer of a multilayer planarizing dielectric layer is added, and wherein the hydrogen treatment includes heating the semiconductor device in a hydrogen rich environment.

14. However, Chen et al. teach HSQ does not convert into a high K until temperatures in excess of 400 degrees C. (col. 2 lines 61 – col. 3 line 1).

15. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the HSQ directly without loss of its dielectric constant.

16. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda et al. (JP 407074167) in view of Wuu et al. (US Patent 5796150).

17. Fukuda et al. teaches the features previously outlined, but lacks introducing the hydrogen by plasma process.

18. However, Wuu et al. teach a method of reducing hot carrier degradation by introducing hydrogen to the gate dielectric by plasma process (col. 5 lines 1 – 4).

19. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to introduce the hydrogen by plasma process as art recognized equivalent.

20. Prior art considered, but not used in the rejection include Yamaji et al. (US Patent 5721601).

Remarks

21. Applicant's arguments filed 23 June 2004 have been fully considered but they are not persuasive. Fukuda et al. perform a hydrogen treatment after formation of the planarization layers, which hydrogen diffuse through to the gate oxide to terminate dangling bonds therein. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Igwe U. Anya whose telephone number is (571) 272-1887. The examiner can normally be reached on M - F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Igwe U. Anya
Examiner
Art Unit 2825

IA

September 6, 2004

W. DAVID COLEMAN
PRIMARY EXAMINER